A POST-PANDEMIC TRAVEL EVALUATION

A CREATIVE PROJECT SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

MASTER OF ART

BY JOLEE EDGE

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Introduction

Airports are one of the most highly trafficked public sites around the world. According to the International Air Transportation Association, more than four billion people flew in 2017 ("More Connectivity and Improved Efficiency - 2018 Airline Industry Statistics Released," 2019). As one of the most pervasive services around the world, airline travel is often criticized for poor processes and service design, i.e., the design of a business's internal processes to improve overall employee and customer experiences. In the midst of the global COVID-19 pandemic, airlines and airports must explore ways in which they can efficiently support large numbers of travelers while also maintaining social distancing.

As flying becomes a regular activity again, a looming concern will be how to get passengers through the airport without putting them in close proximity to each other (Bryant, 2020). Air travel will inevitably continue to change with the global landscape, and some of these changes will likely become the new normal. To maintain social distancing standards, new self-service technologies and new processes may become imperative. Processes travelers experience in an airport that require them to interact or stand in close proximity with others include check-in, security processing, customs, restaurants, gate waiting, restrooms, bus/shuttle transportation, baggage claim, airplane boarding, and on the airplane itself. Thus, this creative project is guided by the following question: How can the use of self-service technology and/or the implementation of new processes effectively minimize human interactions and provide a solution to one of the many breakdowns of the air travel process?

Self-service technologies have been implemented in airports everywhere to increase efficiency and reduce costs and labor (Abdelaziz, 2010). One study found that many users become frustrated with self-service systems and give up using them altogether (Zhang, 2010).

The possibility of an influx of customers at one time attempting to use kiosks will create crowding and line-forming. Major airlines like American Airlines and United Airlines have introduced the use of touchless kiosks. These kiosks allow customers to scan their boarding passes from the airline's mobile application and continue the process on their cellular device, rather than using the kiosk that is used by thousands of passengers each day. This is to help reduce common contact points. Research has also explored passenger experiences in airports to improve passenger experience when designing future airports (Popovic, Kraal & Kirk, 2009). Some of these interactions are with airport processes, such as interacting with airport employees, checking-in, waiting at the gate, boarding the plane, bag drop, and security. Another study discusses suggestions to reduce waiting times and improve overall customer satisfaction based on user profiles (Rossi, Gastaldi & Orsini, 2018). One suggestion is to include real-time route information of how long to get to the terminal, how long lines are at the check-in counter, and how long security lines are. In addition, with the possibility of health check implementation like temperature checks or actual COVID tests on top of other airport procedures, self-service technologies or improved airport processes may be able to assist passengers in carrying out these procedures while also allowing them to maintain a social distance. Although much research has been conducted that focuses on improving the airport experience – including the breakdown of all major processes necessary to travel by air and implementing technologies to aid this improvement – little to no research has been conducted on these processes and their future in light of the COVID-19 pandemic.

To address these concerns, this creative project explores ways that airports can implement new health measures, maintain proper social distancing standards, and continuously improve any breakdowns of the airport process. To provide solutions to the coming changes of

airport processes due to the global COVID-19 pandemic, design thinking was applied to discover what strategies may provide the most efficient passenger experience. User experience research was also conducted to confirm that these strategies will be effective. User experience research included interviews with airline and airport employees, as well as travelers who have flown since the COVID-19 pandemic began. Employees included flight attendants, check-in attendants, boarding attendants, and UX designers.

The main goal of this creative project is to find a solution to one of the many breakdowns of the processes required at an airport that will also consider social distancing and health standards. These breakdowns may include waiting in long lines at the check-in counter, check-in kiosks, and bag drop, being in close proximity to others and causing frustration, standing in line at security in close proximity to others, and waiting to board the aircraft in the gate area, potentially missing announcements or instructions because of other distractions or being away from the gate to maintain social distancing. The airport experience is one that is broken down into multiple processes to reach the goal of arriving in a second destination. These processes include checking-in, checking a bag, going through security, waiting at the gate (to board), boarding the plane, flying, deplaning, and waiting for baggage in baggage claim. Upon completion of this project, there will be a better understanding of how to keep passenger experiences efficient and safe with self-serve systems and/or improved processes, as well as how to better accommodate large numbers of passengers.

The following sections are structured as follows: The literature review builds an understanding of the research that has been conducted in the realm of an airport traveler experience broken down into check-in, security, and the gate/boarding process, as all of these are checkpoints of an airport that passengers may interact with some sort of technology. The project

design chronicles user experience research and design thinking activities that informed the creative project. The Post-Pandemic Air Travel Solution chapter presents a solution of how to improve the breakdowns found. The discussion chapter provides the discussion of the significance of the project, limitations of this creative project, and future research.

Literature Review

This literature review discusses the major aspects of the airport experience in which technology may play a role in the customer's journey. These primary focuses include check-in, security, boarding, and the waiting time between processes.

Airport Customer Experience

In light of the global COVID-19 pandemic, processes that are required during air travel will now provide challenges of cost and efficiency to maintain health and safety standards. To keep the customer at the center of the user experience model, it is important to understand that the customers are actively participating in their airport experience. This being said, the decisions they make throughout this experience could either help or hinder their experiences with no fault to the processes in place (Popovic, *et al.,* 2009), and all airport customers traveling to the same destination may have a different experience. Airports must provide customers with decisions that will allow them to move through the experience safely and efficiently.

It can be noted that airline companies use competitive differentiation to enhance their own user experience (John, Simons, and Bouwman, 2009). While this may be beneficial for the companies, it could be seen as inconsistent by passengers. For customers to have a successful experience, the experience must be designed to provide emotional satisfaction (John, Simons, and Bouwman, 2009). For example, a customer should not end a process feeling unsure of their next steps or whether they completed the process correctly.

According to Tuchen, et al. (2020), the COVID-19 pandemic has resulted in a need for a shift in focus. To achieve this shift, the user experience's potential must be fully understood in a way that does not just focus on how COVID-19 issues can be solved, but how to continue to improve the airport experience for all that interact with it. To develop this understanding, all

airport customers and their experiences must be considered by the UX design community. While this is a major feat, it will help develop an understanding of all the ways a passenger may experience the airport while traveling. Only then can this understanding be the base for potential new strategies along with a combination of already-existing design concepts and methodologies that will then be transformed into flexible entities for all airport customers (Tuchen, et al., 2020). Tuchen et al. also stated that airport systems used on a day-to-day basis can and should be made more agile, flexible, and resilient. To do so, an understanding of what has happened, what is happening, and what might happen must be embedded into strategic decisions for the future.

Figure 1 illustrates a traveler's journey through an airport and how it is affected by many other aspects and that the journey should be evaluated from more of a holistic approach. For example, every person that plays a role in the airport ecosystem, an airport customer, a ticket agent, or the cleaning personnel, all experience the same airport system through its built environment, technologies, services, and procedures, and can, in turn, be connected to each other's experiences.

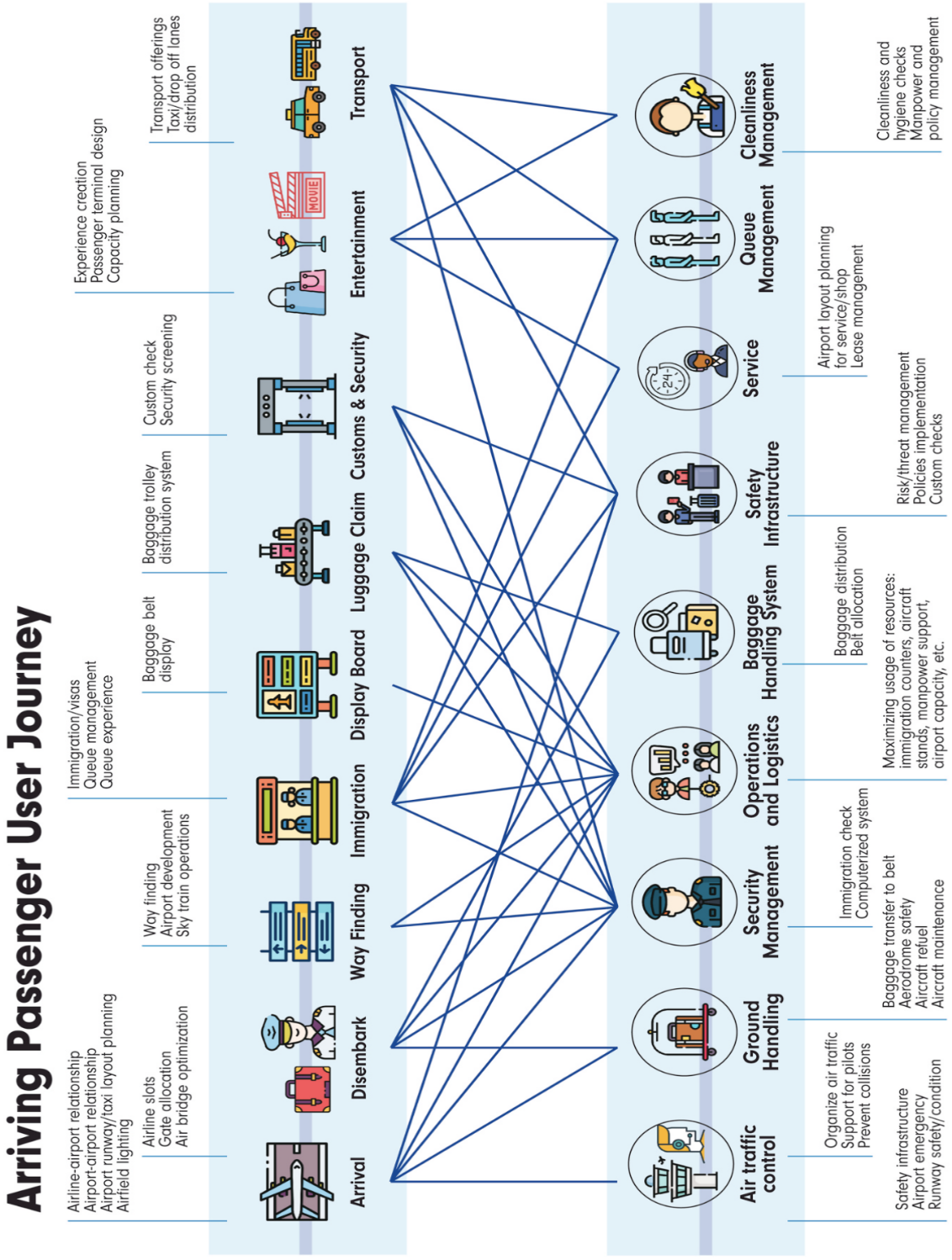

Figure 1. User journey for a passenger and system connections (Tuchen et al., 2020).

It may be ideal for airports to use this user journey to create an experience that allows passengers the access to this knowledge to avoid large groups at a time. This would aid in efficiency for the aforementioned breakdowns of the airport processes where passengers may spend a long time waiting while also being surrounded by large numbers of people. For example, being able to know the wait times or number of passengers sitting at the gate could be used to avoid the spread of disease (Tuchen et al., 2020). This information may also be helpful for the terminal when passengers may not be near their gate to hear important announcements regarding their flight being made and could be on display throughout the airport or by other means.

Check-In

During check-in, some passengers may use self-service technologies to reduce wait time, while others may choose the ticket counter to confirm their flight times, seats, layovers, and baggage. However, the issue of large numbers of people waiting in line at the ticket counter or for the kiosks and touching the same machines begs the question: How might airlines and airports minimize physical contact among customers, customers and employees, and customers and self-service technologies, while also providing an efficient air travel experience? As previously mentioned, a customer should end a process feeling satisfied and confident to move on to the next step, as after using a self-service kiosk, receiving indication that they have completed all necessary action items and are ready to go to the TSA checkpoint.

The check-in process allows for three options: checking in online/at home, at the check-in counter at the airport, or at a self-service kiosk at the airport. While based on a more international demographic, Lu *et al*., (2011), confirms that younger customers prefer the use of self-service technology over the traditional desk check-in. To have an efficient use of the self-

service kiosks, it is essential to have an employee readily available and observing to help customers increase their transaction speed (Abdelaziz, Hegazy & Elabbassy, 2010).

Airports are filled with technologies used by customers thousands of times each day. The implementation of self-service check-in kiosks has reduced the number of passengers in the check-in area at the airport because they reduce the need for lines (Abdelaziz *et al.,* 2010). While these devices assist in reducing the worry of social distancing, considerations must be made about physical contact with self-service technologies in the time of a pandemic. In airports, customers can use self-service technologies to purchase airline tickets online, check-in over the Internet or mobile phones, pick up boarding passes at airport kiosks, receive flight updates on their mobile devices, and now scan themselves to board the aircraft. (Castillo-Manzano & López-Valpuesta, 2013).

Security

According to Popovic, *et al.*, 2010, agents at the security checkpoints are more focused toward the screening machines rather than creating an efficient service for the customers. Most other noted airport processes have been imagined with the user in mind, the security process still acts as a conveyor that airport customers are placed upon rather than designing the experience around the customer. An increasing number of security systems with biometric recognition have been implemented in airports all over the world, not only for employees, but for travelers, too (Sasse, 2007). These biometric recognitions put the customer at the center of the process and put them in control with the assistance of agents standing by when necessary.

As in many airports, lines are controlled using a snake formation. With this formation, social distancing is almost impossible, as those in line may stand six feet apart, but the snake formation will allow passengers to potentially be standing shoulder to shoulder.

Boarding

To reduce the number of contact points, customers now scan their own boarding passes, but are also being offered fewer or no amenities, such as food and beverage in-flight (Bryant, 2020), which may cause frustration for travelers. The potential of implementation of health-screenings prior to flying is another aspect of air travel that will need to be considered as part of the process that will need to be evaluated for efficiency (Bryant, 2020).

Reduced boarding times might also affect passenger satisfaction; if waiting time and stress at the airport can be reduced, passenger experience can be improved (Hiemstra-Van Mastrigt, Ottens, & Vink, 2019). One main boarding issue noted by Hiemstra-Van Mastrigt et al. (2019), is communication, saying that audio announcements communicated during the boarding process are unclear and unfocused, causing a bottleneck effect of passengers boarding the plane. To allow passengers to better prepare for the boarding process, the use of screens and other visual opportunities may be more effective, which could mean the implementation of more announcement screens throughout the gate areas, or the use of mobile device technology for customers who are on their devices. Also, according to Hiemstra-Van Mastrigt, et al. (2019), the use of lighting to get the attention of passengers to indicate the time of boarding, whether it be projections on the floor or another use of lighting to inform customers rather than possibly-confusing audio announcements.

Waiting

One major consideration of the airport process is waiting. Customers are either going through a process or waiting to go through a process. Waiting to check-in, waiting to go through security, waiting to board the plane, waiting to de-plane, and waiting for their baggage in baggage claim. One suggestion is to create an experience relevant to the end goal of the wait, for

example, airline passengers could view television monitors that display the progress of the baggage from the airplane to the baggage claim (Norman, 2009). This same suggestion could be applied to all waiting aspects of the airport, using the waiting time as a time to show customers what they are waiting for, and why they may have to wait.

This literature review breaks down the traveler experience into check-in, security, and the gate/boarding process. All of these checkpoints of the airport process that passengers interact with may require interaction with some sort of technology. Each section helps to build an understanding of what research has been done about each part of the process and will help in this creative project by applying the research to create a feasible, convenient solution.

Project Design

This project engaged 22 participants from three stakeholder groups – civilian travelers, airport workers, and airline employees – in interviews to explore ways that airports can implement new health measures and maintain proper social distancing standards while providing the most efficient passenger experience. It should be noted that all interviewees were English-speaking Americans. These activities were driven by the following guiding question: How can we use self-service technology and/or implement new processes to minimize human interactions? This project also engaged four students from the center for Emerging Media Design and Development at Ball State University in one design thinking session to ideate solutions to the given problems.

Interviews

To ensure a user-centered approach to future design and development, empathy research in the form of interviews with stakeholders was conducted with airline employees, airport employees, and civilians who have traveled since the COVID-19 pandemic began. These stakeholder groups were interviewed to gather information about current airline and airport practices, how they have changed since the COVID-19 pandemic began, and what plans may exist for future change. Interviewees included flight attendants, check-in attendants, boarding attendants, and UX designers.

UX designers and flight attendants were contacted through personal reference and via LinkedIn. Airport employees were contacted through personal reference. The third group of interviewees comprised civilians who had flown domestically on any major airline since the COVID-19 pandemic began to understand both the procedural side and the experience side of the flying process. Civilian participants were identified via a convenience sample, as they were all

acquaintances of the researcher. Goals of this creative project were explained for the interviewees to best understand how to answer the interview questions

Each group of stakeholders was given a set of questions specific to their roles as stakeholders. UX designers were asked eight questions (Appendix A) regarding how the COVID-19 has impacted their way of designing for the airport experience, airline and airport employees were asked ten questions (Appendix B) regarding how their roles have changed as a result of the COVID-19 pandemic, and civilian customers were asked six questions (Appendix C) regarding their flying experiences both pre- and post-COVID-19.

Once all interviews were concluded, six themes emerged after conducting an initial coding of the interviews. These six themes were based on commonalities of answers from the interview participants. These six themes are: social distancing concerns, self-service touchpoints, important questions asked, important comments, signage and communication, and new implementations.

For social distancing, there was much concern from civilian flyers on the lack of enforcement of social distancing throughout airports across the country. Self-service touchpoints are a commonly used piece of technology in airports, and with that came a lot of comments from the interview participants about the use and placement of these technologies. With almost each interview, participants would raise important questions that would eventually lead to the definition of the problem spaces and lead to potential solutions. The same went for comments made by participants. Concern about signage and communication was somewhat common between both civilian flyers and flight attendants as gate announcements, text updates, and airport signs can at times be misleading. Finally, since the COVID-19 pandemic, many new implementations have been enacted, leaving many participants with comments and concerns.

After reviewing the first six themes and gaining an understanding of each response under these themes, responses were organized into another five themes. These themes are: boarding, lines and waiting, check-in and bag check, consistency, and technology. The five themes allowed a further breakdown of the conducted interviews to a deeper exploration of all the potential issues a passenger may run into while traveling.

When interviewees discussed boarding, they shared concerns with both social distancing and "randomness" of the boarding process itself both pre- and post-pandemic. Lines and waiting were a major concern for interviewees as this also brings up social distancing concerns but also frustrations of having to wait long periods of time because of heavily trafficked areas. Check-in and bag-check was a pain point of many passenger's journeys because of the inconsistency and time-consuming process that checking in and checking a bag can be. There was much concern about the common touchpoints of this particular airport process. As mentioned previously, consistency was another notable theme from the interviews. Inconsistency with TSA traffic is frustrating, as to passengers, TSA should know when to expect an influx of passengers due to the flight schedule and have appropriate staff. Other inconsistencies include procedures between different airlines, checking in on an airline app versus in person versus at a kiosk, and passenger updates between apps, monitors, and gate agents. Lastly, a major topic of conversation was technology. Technology allows passengers to self-serve, especially with 81% of Americans owning a smartphone (Demographics of mobile device ownership and adoption in the United States, 2020), passengers are able to complete simple tasks on their own, leaving airport and airline workers to assist those who may need extra help, thus reducing unnecessary congestion.

Finally, once these five breakdowns were acknowledged and understood, five key problem spaces were created. These key problems were then turned into generic user journeys

designed to illustrate typical experiences airport travelers often encounter. Each user journey reflects the issues discovered throughout all interviews conducted that this creative project aimed to solve.

User Journeys

A user journey is a flow diagram that shows step by step the journey a user takes to reach their goal. In this project, the user journeys show multiple customer's processes of using air travel, specifically identifying where the breakdowns of these processes are. Below you will find the five user journeys and the breakdown of pain points experienced by each passenger.

In Figure 2, a user journey describes a passenger who travels often, but is currently anxious about traveling during the COVID-19 pandemic. She worries about social distancing and the many touchpoints that come with being in an airport. The tension point with this user journey is that the passenger is forced to be away from the gate and monitor the time herself until it is her boarding time.

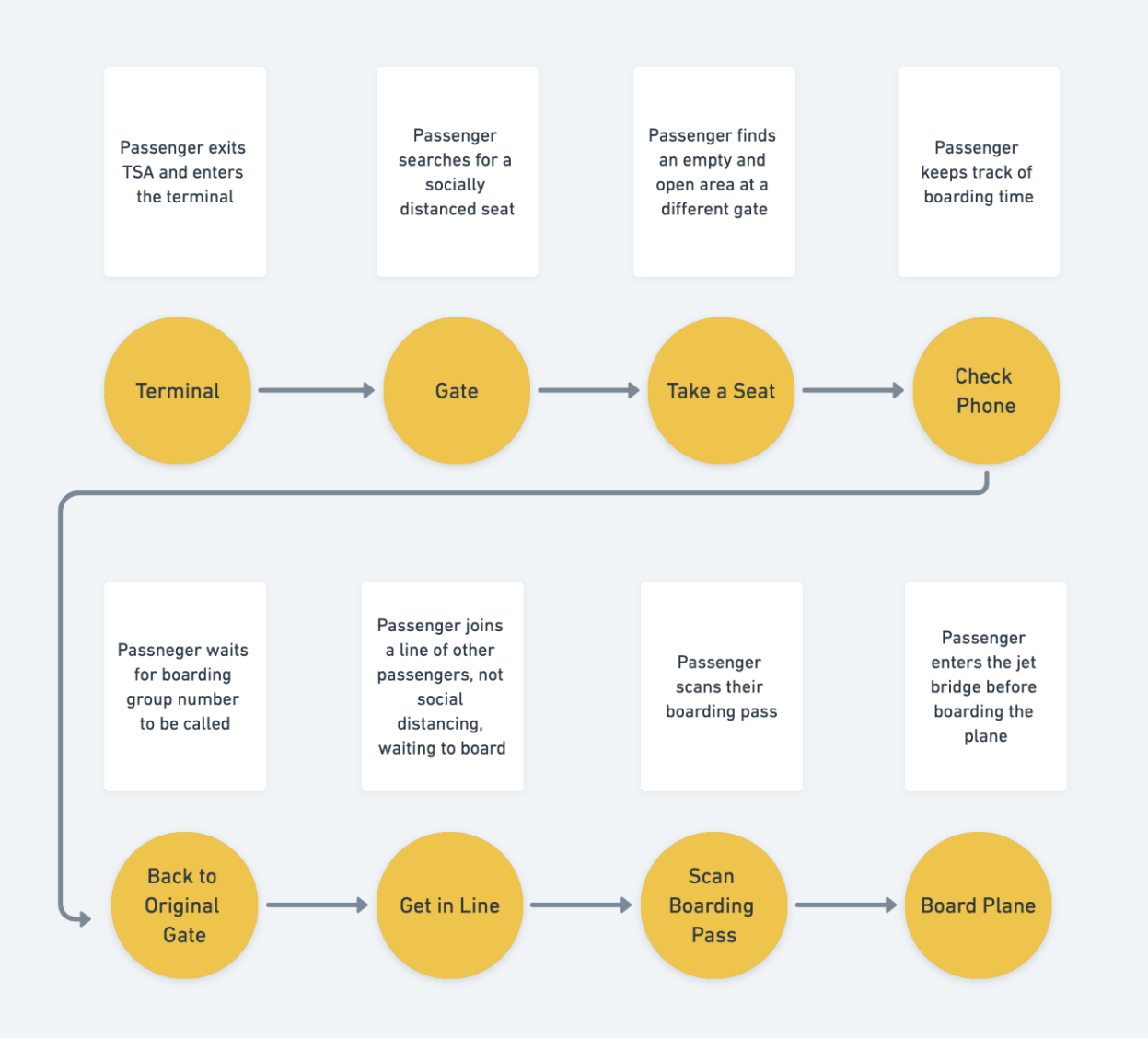

Figure 2. A passenger has trouble finding a socially distanced spot to wait to board their flight.

In Figure 3, a second user journey demonstrates a passenger who stops at a restaurant in the terminal before going to their gate. At the table next to them, they overhear a couple talking about how their flight to Seattle is delayed. The passenger checks their phone to see a text update saying their flight has changed, but with no extra details. After a conversation with the table next to them, they discovered they are on the same flight, but had different updates. The tension point

is the lack of consistency between passengers, gate agents, and airport monitors set up around the terminal.

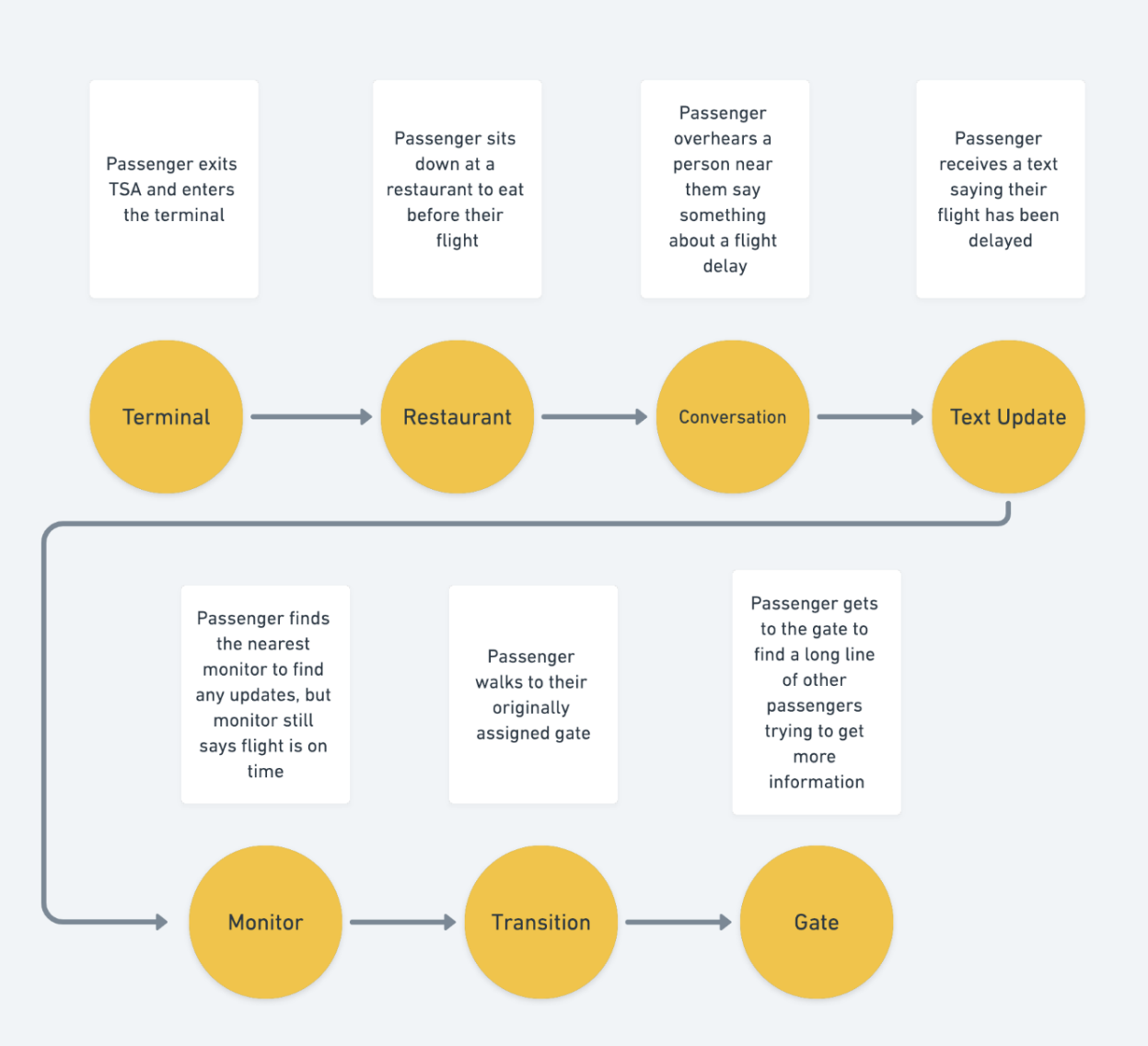

Figure 3. A passenger is frustrated by the lack of consistency and transparency between flight updates.

Figure 4 demonstrates a user journey where a passenger has a layover in Dallas, one of the largest airports in America. During their flight change, they have to go to a completely different terminal. This passenger will have to rely on the signs to get them where they need to

go. The tension point in this user journey is that the signs are not always very intuitive and can lead passengers astray and confused.

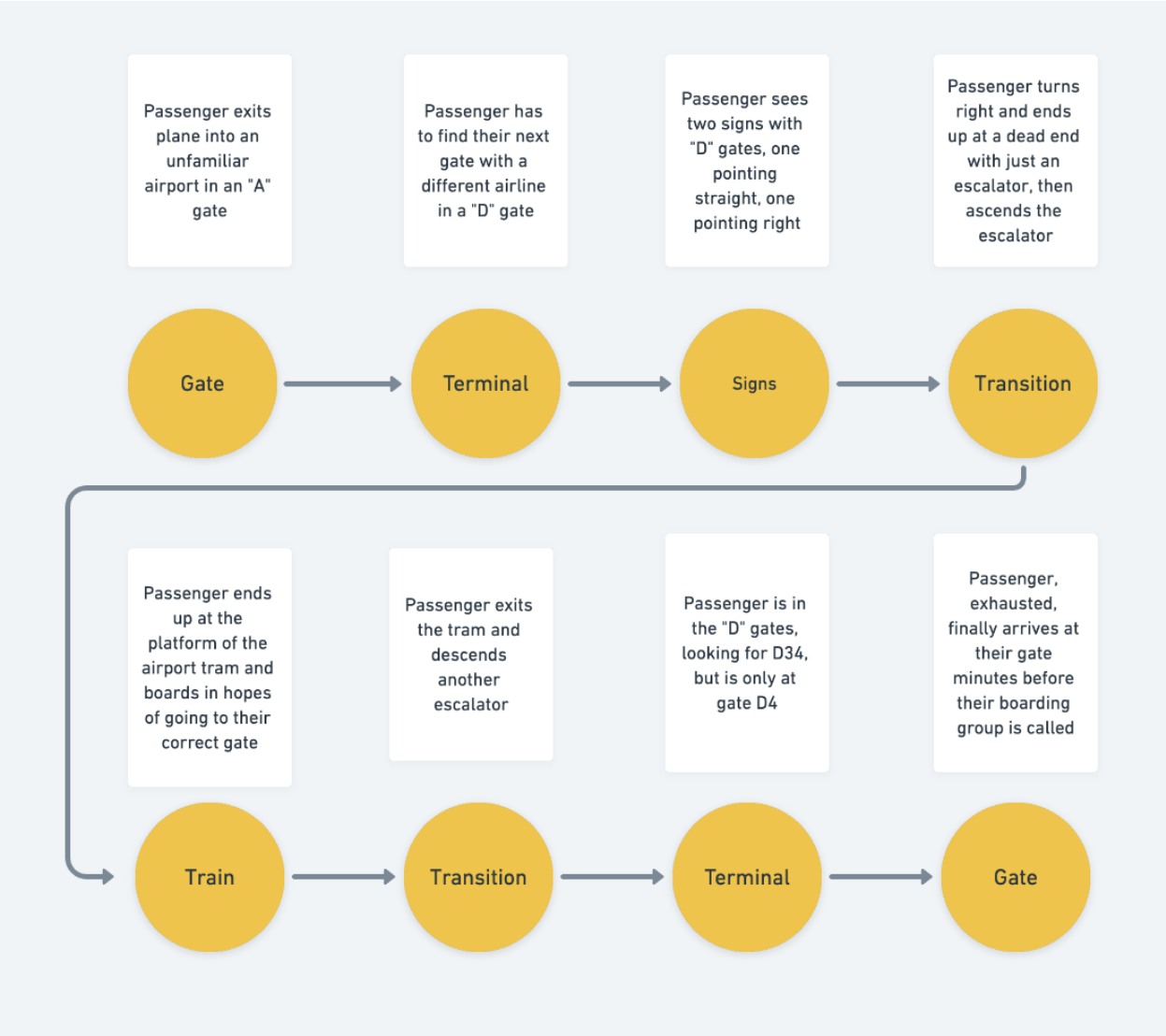

Figure 4. A passenger feels lost and anxious in an unfamiliar airport trying to find their connecting flight.

In Figure 4, a user journey demonstrates a passenger who typically enjoys using the kiosks at the airport to be self-sufficient. Since COVID, they have been extra cautious, but the

only working kiosk is being used by someone with a cough. With no worker around to clean the kiosk, this passenger is left disgusted and frustrated.

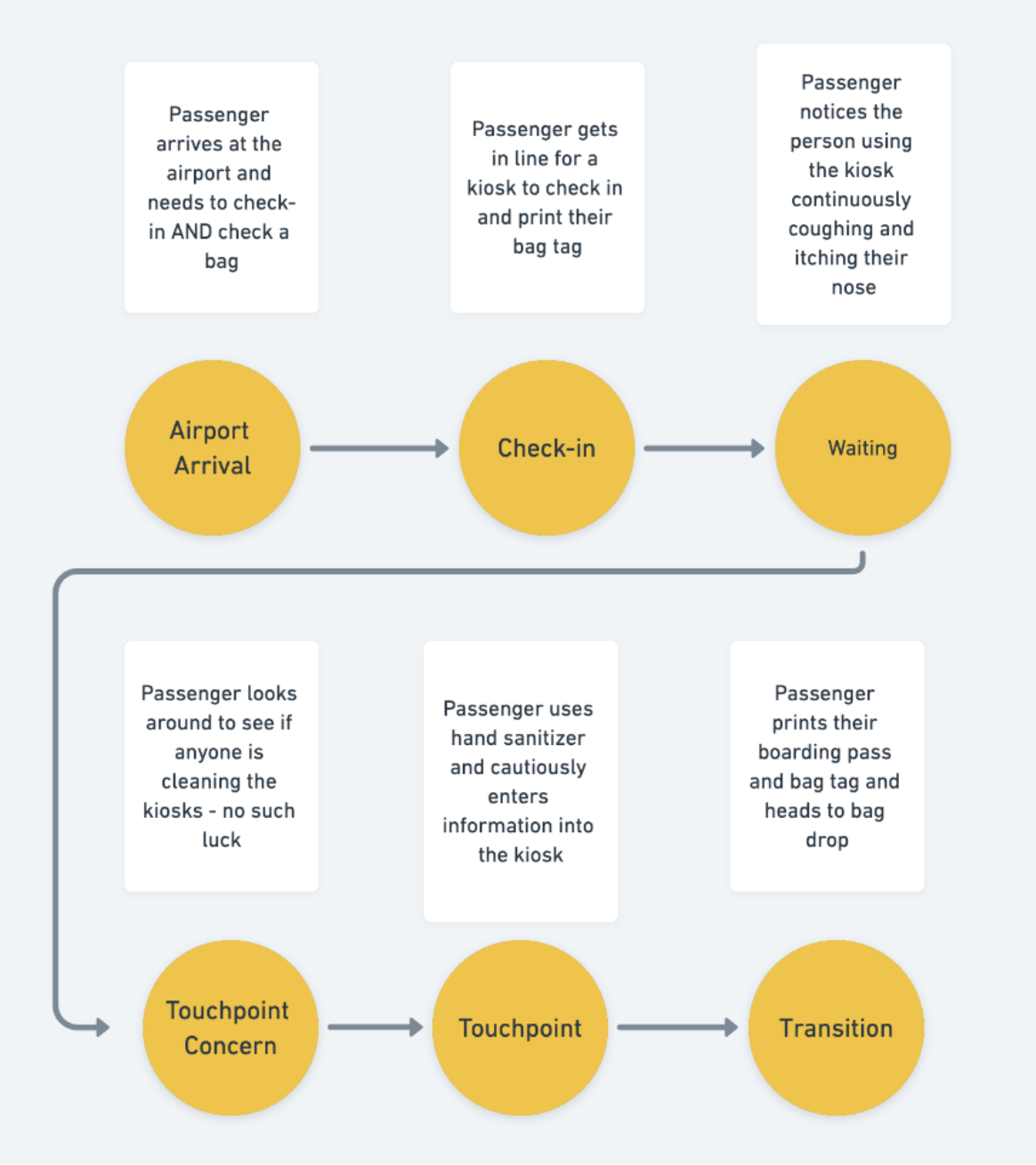

Figure 5. A passenger feels unsafe using common touchpoints at an airport, but still wants to remain self-sufficient in getting through their journey.

The user journey represented in Figure 6 demonstrates a passenger that gets stressed going through TSA because they have never had a pleasant experience doing so. This time, the

TSA line they join gets backed up and the passenger is clustered with multiple passengers… during a pandemic.

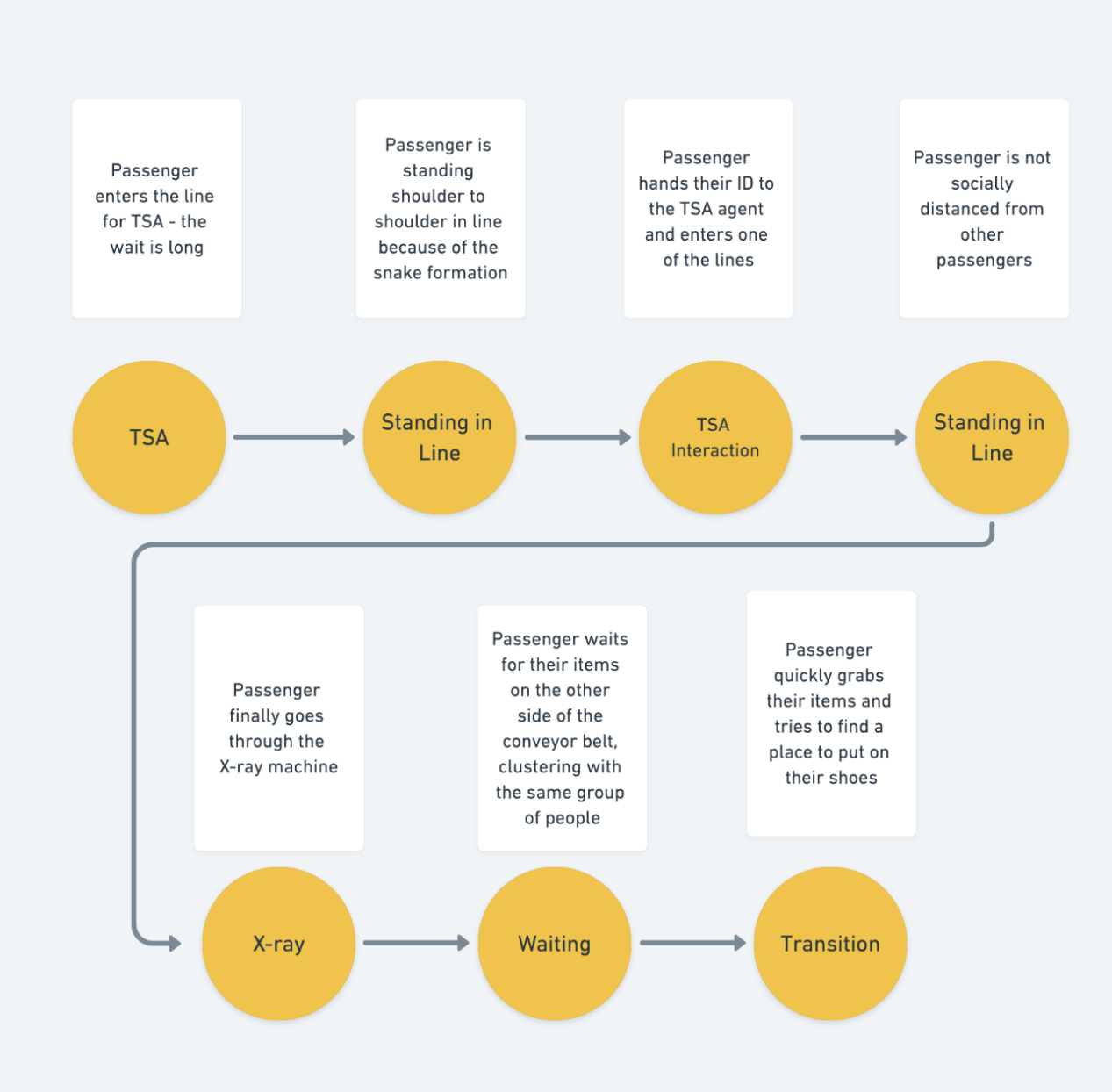

Figure 6. A passenger becomes part of a TSA line backup and feels there is no social distancing or use of communication between airport employees to prepare for an influx of passengers.

Design Thinking Sessions

From the empathy interviews with travelers, airport employees, and airline employees, five user journeys were created to define the potential breakdowns during a passenger's journey at the airport. One brainstorming session was held with students from the Emerging Media Design and Development program where these user journeys were used to help inform the design thinking process and ideate solutions to these breakdowns. During the brainstorming session, "how might we" questions were used to find a design-driven solution to the breakdowns in the user journeys.

Design thinking is a process used to gain understanding of what works and what doesn't and is made up of five steps: empathize, define, ideate, prototype, and test. Service design uses this methodology to solve problems beyond product and digital experiences, like airports or grocery stores. Design thinking was used in this process to empathize with stakeholders to gain an understanding of all perspectives of the airport process. The second stage of design thinking is "define," the problem solved in this creative project was defined after empathy interviews were conducted. Third, design thinking sessions were held to ideate potential solutions to the problem. Fourth, a prototype of the decided solution was created. Finally, the prototype was tested with stakeholders.

Procedure

The process of design thinking includes empathizing, defining, ideating, prototyping, testing, implementing, and evaluating. The empathizing process included interviews to understand each stakeholder group: travelers, airline and airport workers, and airport experience researchers and designers. To define the problem included taking response to interview questions, combining like-answers, and conducting research to conclude the most common

issues noted by stakeholders. A design thinking session was held to assist in the ideation process to develop solutions to the problems defined by the interviews conducted.

Post-Pandemic Air Travel Solution

Through an understanding of the empathy research conducted, a possible solution to solve the problems defined in the user journeys, the Universal Airport Application was created. The Universal Airport Application provides a system for passengers to use throughout their airport experiences. The application uses location-based technology, QR code technology, and addresses assertions by Tuchen, et al. airport processes and informational support should provide a transparent and efficient traveler experience. For example, using location services via apps is already common; therefore, location services would allow the app to communicate approximately how many passengers are in a specific area of an airport, which could provide passengers with information about areas of the airport that are less populated. Additionally, QR codes and Bluetooth technology reduce the frequency with which passengers have to touch screens or other objects, an important public health issue. Instead, the Universal App would allow passengers to complete tasks like check-in using their mobile devices. Finally, the use of existing information, such as information about flight delays or the location of a passenger's luggage, presented in a single app creates transparency among airports, airlines, and passengers.

Figure 7, the same passenger as in Figure 2, goes through the same user journey, but instead, using the Universal Airport application to assist them through their journey. In this journey, the app helps the passenger find a less congested area in the airport that is near their gate, and also notifies them when their boarding group is almost up to board the plane.

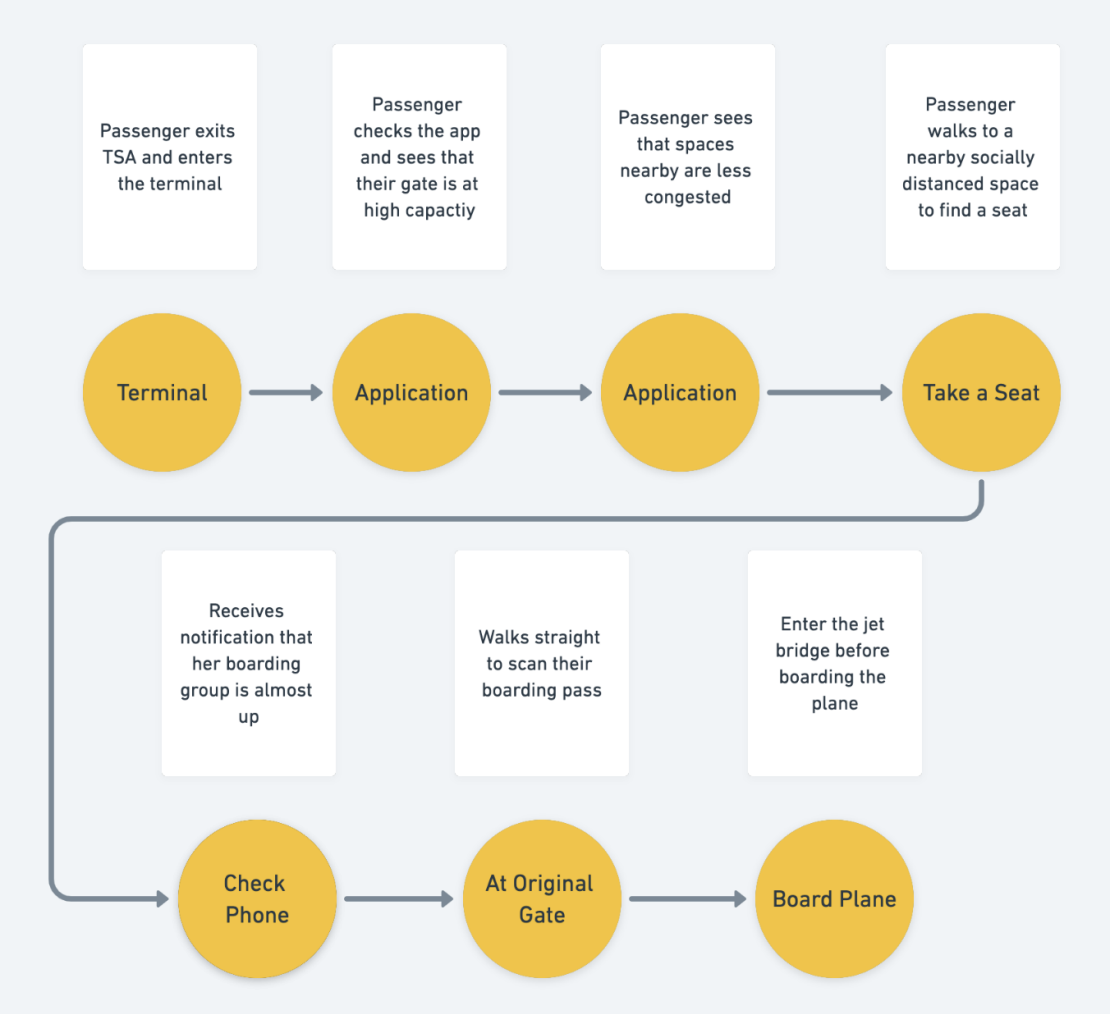

Figure 7. The Universal Airport application uses in-app location services to estimate the number of passengers in a given area to allow other app users to avoid heavily trafficked areas.

Figure 8 is the same passenger as Figure 3, but using the Universal Airport app, is quickly notified of their flight delay. On top of a notification, they receive a generic reasoning behind the delay, their new departure time and gate, and are offered suggestions for the extra time they have.

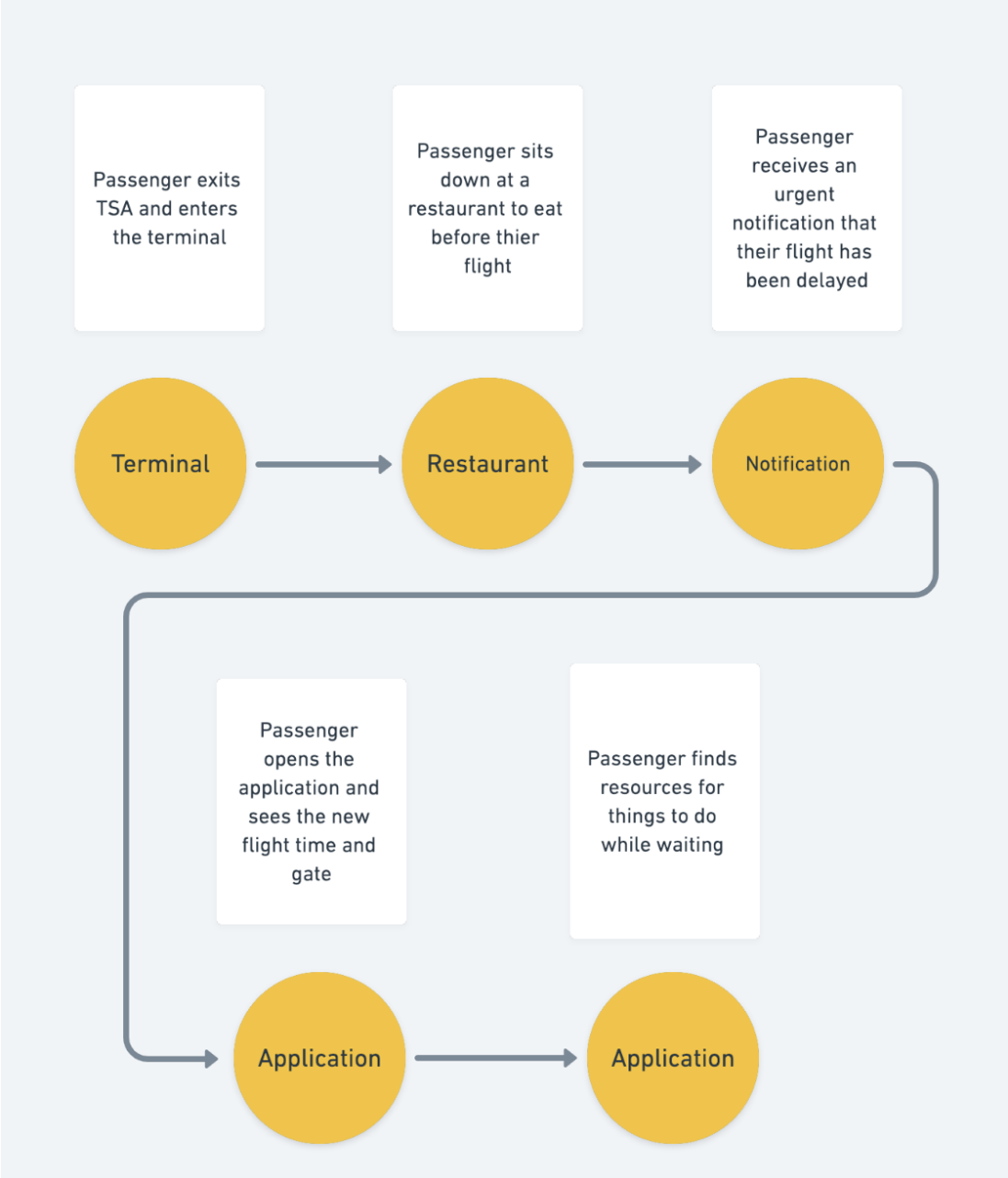

Figure 8. The Universal Airport app uses known airport knowledge and puts it all in one convenient location for all passengers with a smartphone.

Figure 9, the same passenger as in Figure 4, uses the Universal Airport application and its map services to find the quickest route to their connecting flight. Rather than relying on signs that may get confusing, the application walks the passenger step-by-step through the route with an estimated time of arrival.

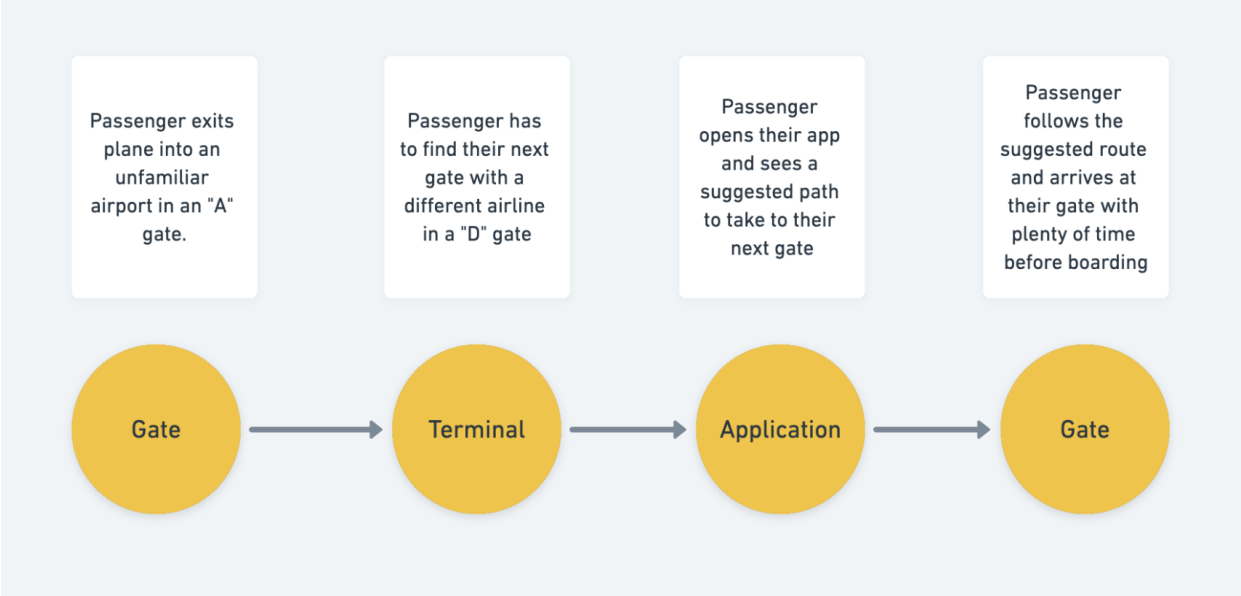

Figure 9. The Universal Airport app uses in-app location services to provide the passenger with the quickest route to their connecting flight.

Figure 10, the same passenger as in Figure 5, uses the Universal Airport app to have a touchless experience to avoid common touchpoints at the airport. The passenger is able to print their boarding pass and bag tags without coming into contact with any touchpoints.

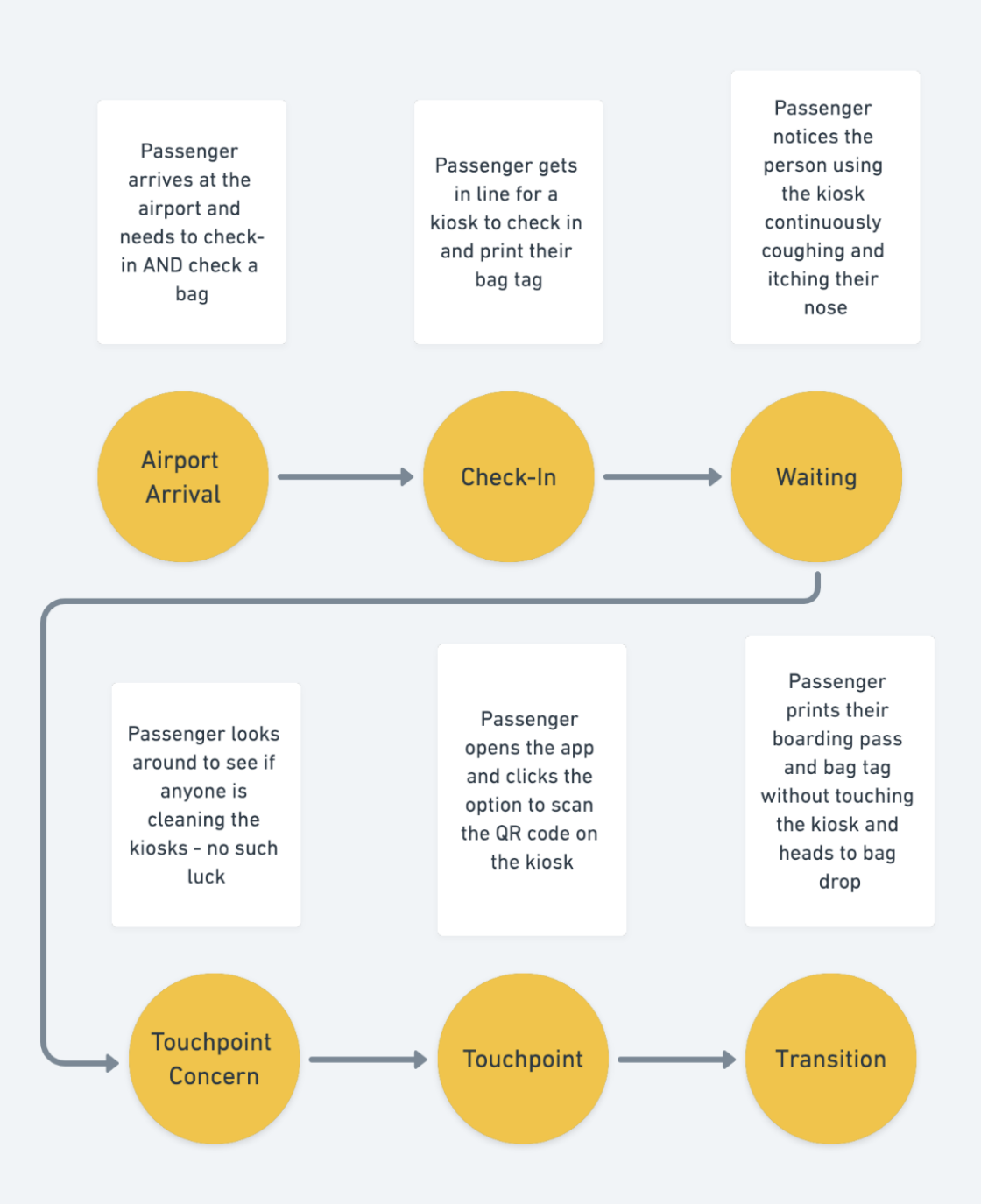

Figure 10. The Universal Airport app uses Bluetooth and a QR code on a kiosk to complete all technological tasks from their own device.

Figure 11, the same passenger as in Figure 6, uses the Universal Airport app to avoid long lines and heavily trafficked areas by informing them of wait times and using the knowledge

of flight departure traffic to inform passengers when and where the heavily trafficked times will be. This will be effective for passengers going to check-in lines and TSA lines.

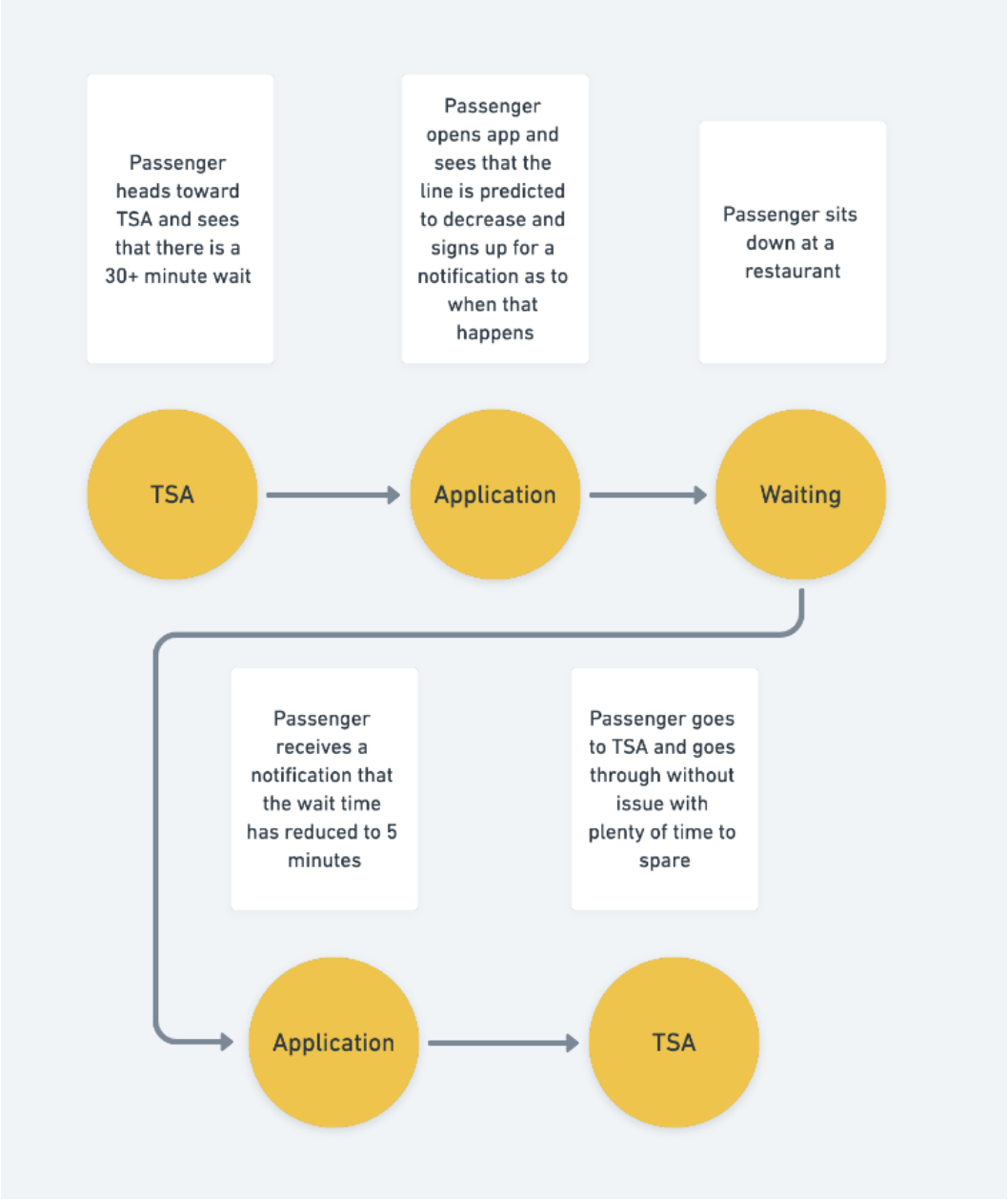

Figure 11. The Universal Airport app will use in-app location services and notification services to inform passengers of wait times.

Universal Airport Application

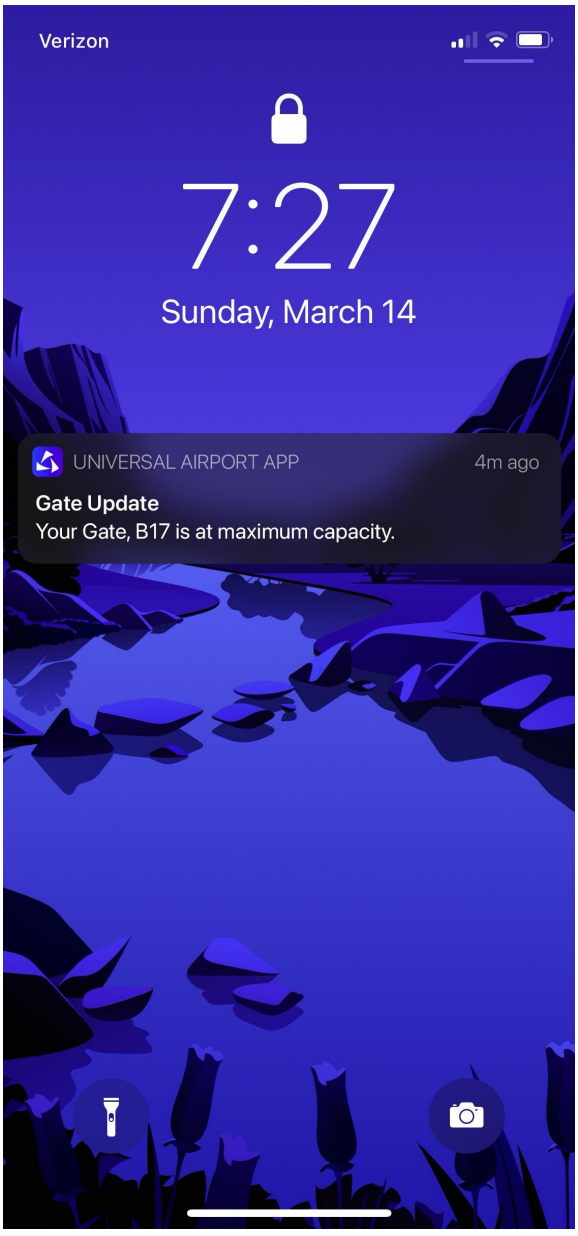

Image A. Lock screen - gate capacity notification

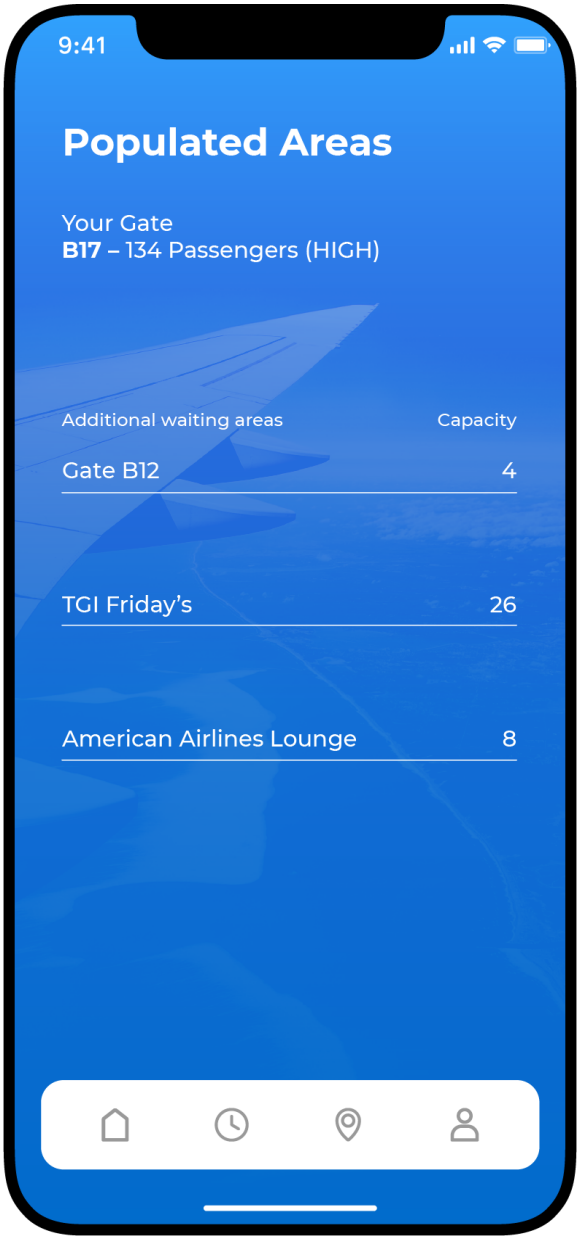

Image B. Application display once notification is clicked

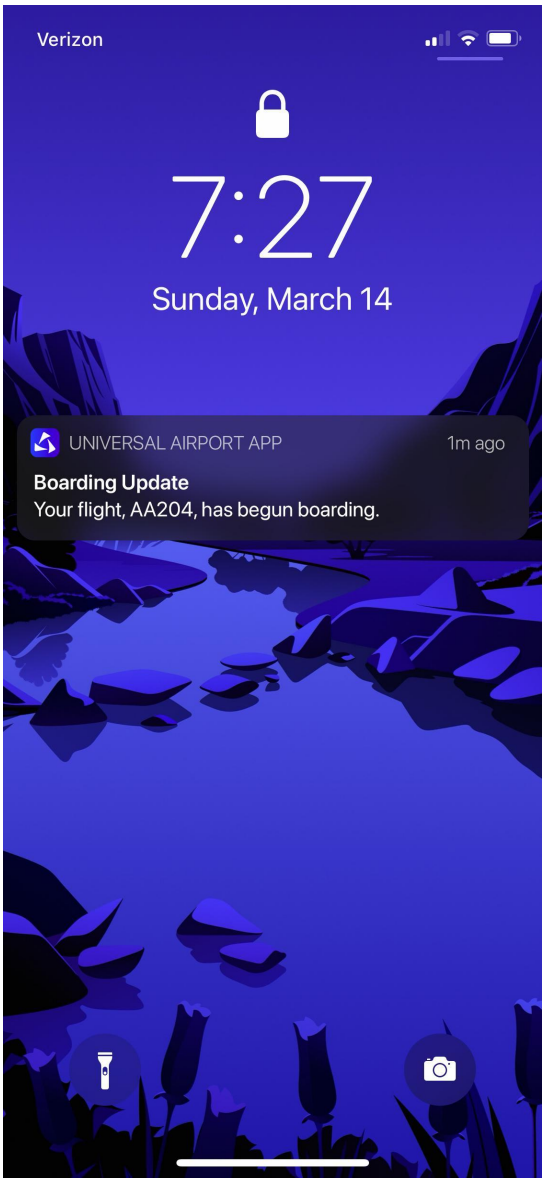

Image C. Lock screen - boarding notification

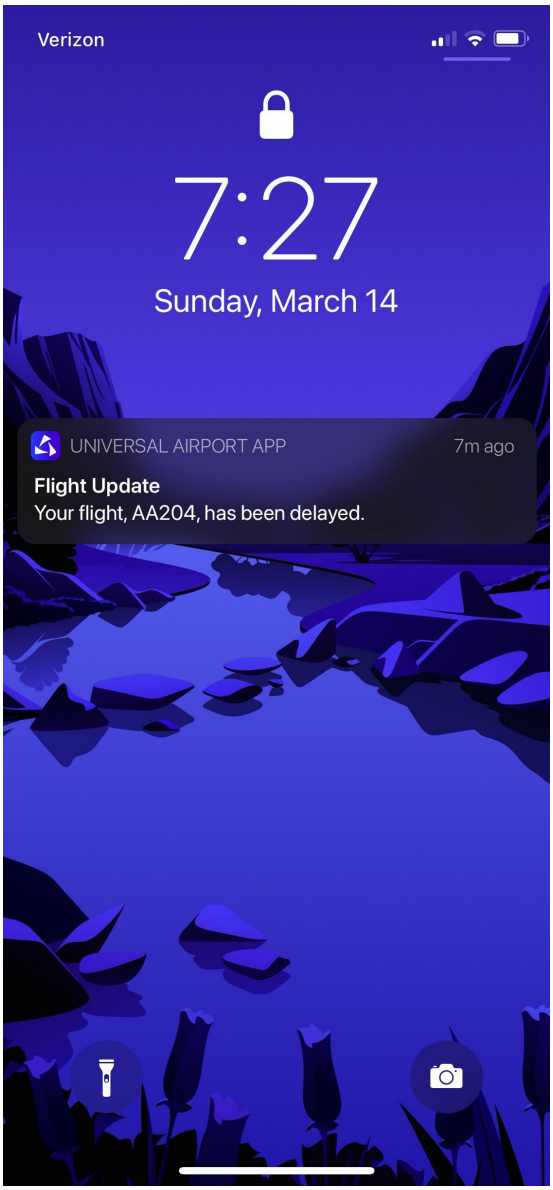

Image D. Lock screen - flight delay notification

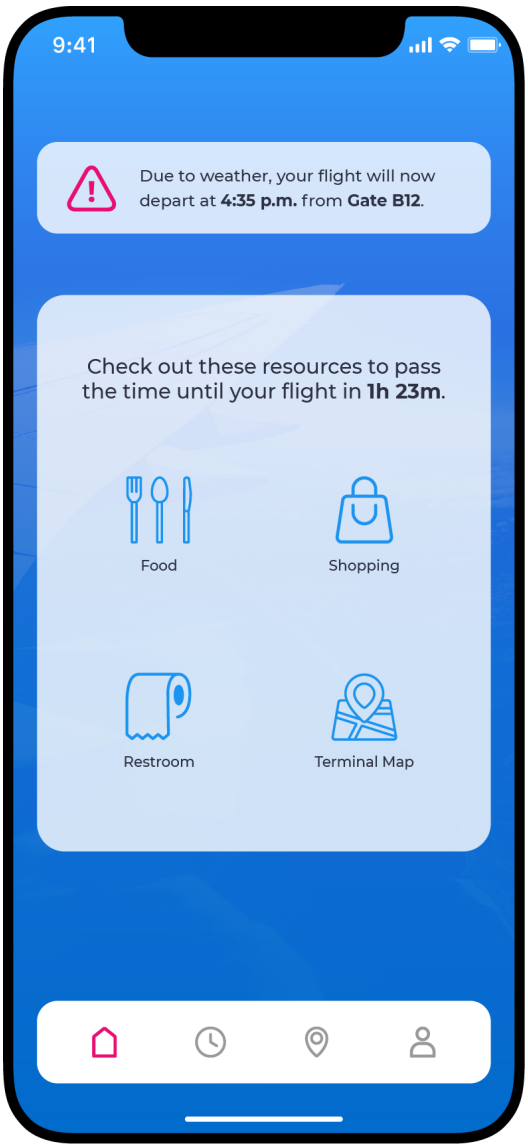

Image E. - Application display once notification is clicked

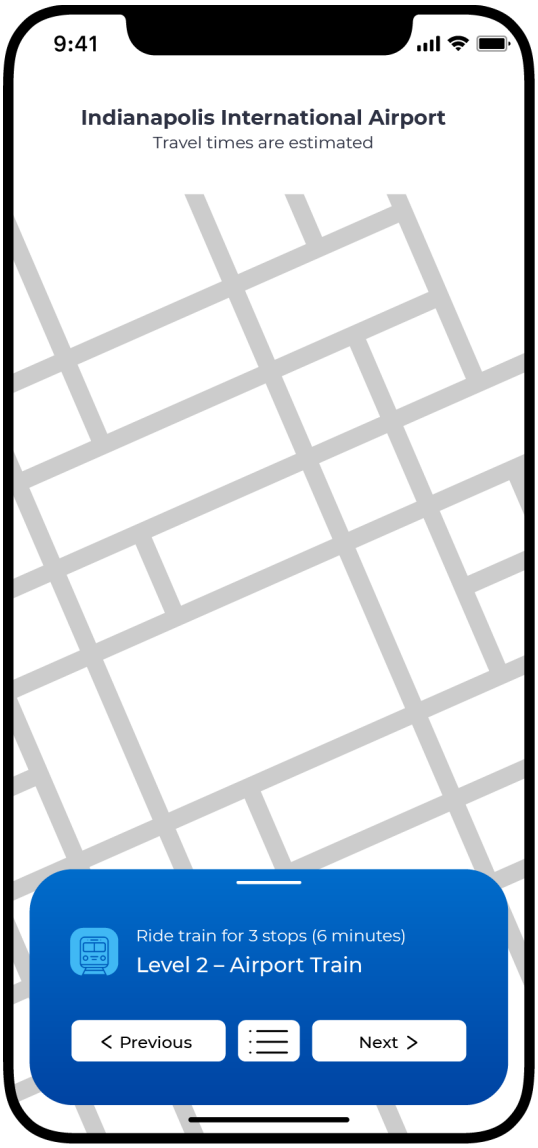

Image F. Application map feature

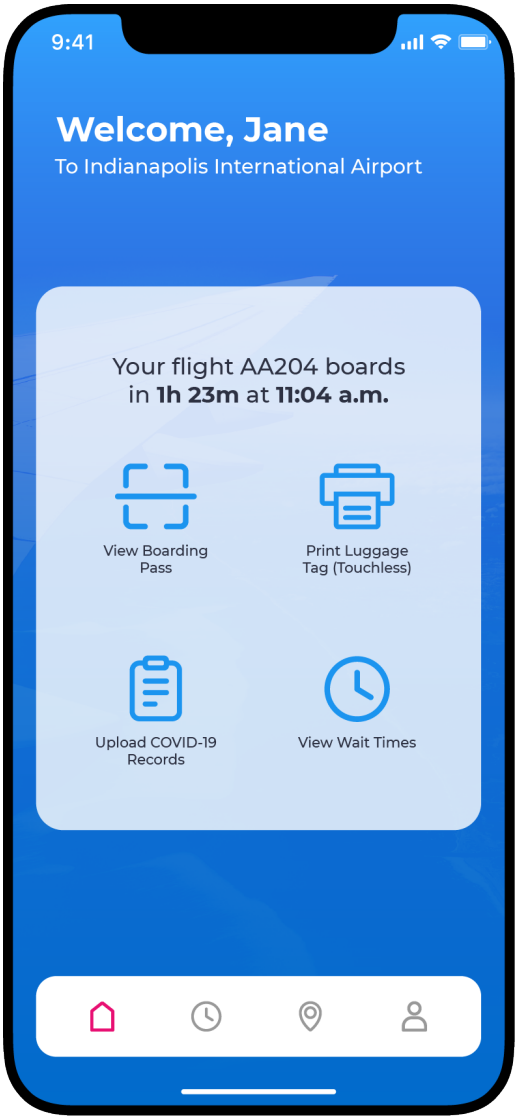

Image G. Home page of application

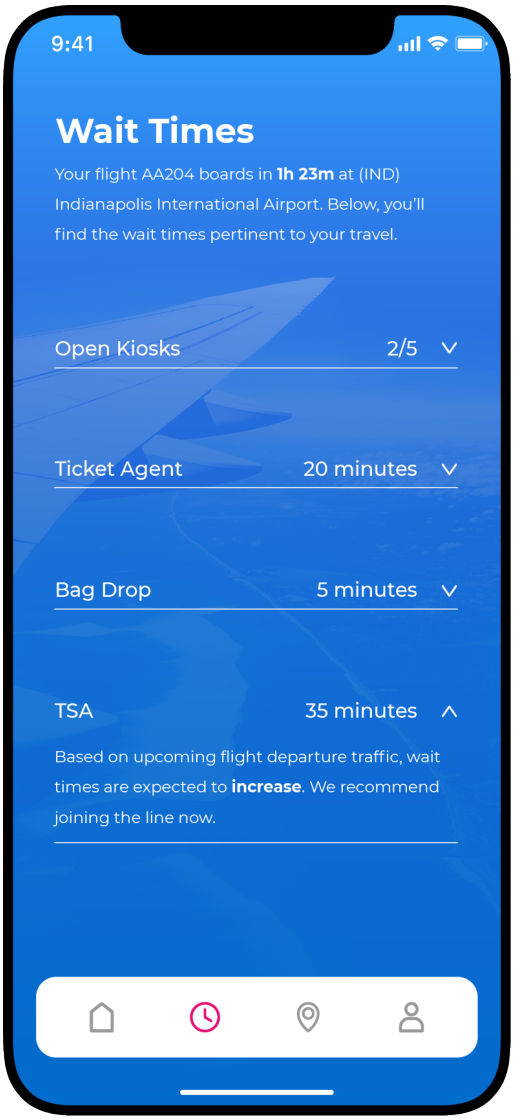

Image H. Wait times application feature

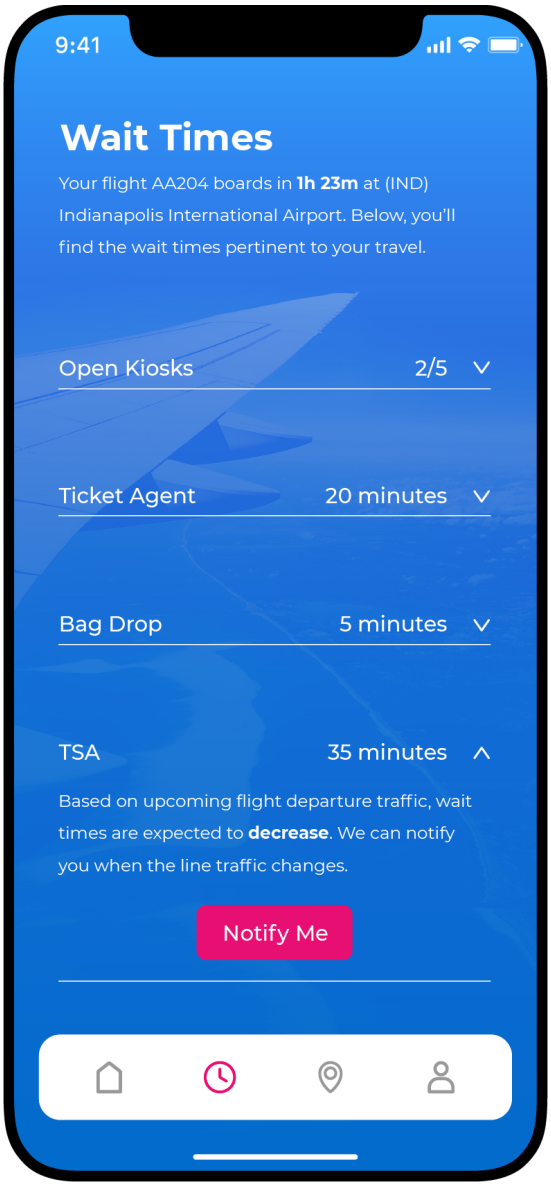

Image I. Wait times application feature with notification

Images A, B, and C display the screens that the passenger in Figure 7 would use. When the passenger was notified that their gate was at a high capacity, the passenger should click the notification and the Universal Airport App will display approximate capacities in gates and areas nearby the passenger's gate. The application then also will notify the passenger when boarding begins so they know when they need to go back to their gate.

Images D and E display the screens that the passenger in Figure 8 would use. The first image shows the urgent notification that the passenger would receive once their flight was delayed. The second image is what would appear once the passenger clicks on the notification. The application will then show a more detailed message about the reason behind the delayed flight, the new flight time, and the new gate the flight will depart from. The second image also displays nearby suggestions for passing the time until the flight.

Image F displays the screen that the passenger in Figure 9 would need. This image displays a map that shows the suggested route to the passenger's destination with approximate times. The map takes the passenger step-by-step from their current location to their destination.

Image G displays the screen that the passenger in Figure 10 would need. This image displays all the necessities a passenger may need when first arriving at the airport. This portion of the application acts as a hub for passengers to allow for a seamless check-in experience with avoidance of common touchpoints and maintaining of social distancing. Another feature of this screen is that passengers are able to upload required COVID-19 documentation and also check wait times of different locations around the airport.

Images H and I display the screens that the passenger in Figure 11 would need. This image displays the wait times of necessary checkpoints that a passenger may go through at the airport. A feature of this part of the application is that when wait times are long, a passenger can sign up for a notification for when the line decreases. The application uses known flight times and expected traffic to determine the decrease and increase.

Discussion

This creative project used design thinking to discover where the breakdowns exist in an air traveler's experience. Results from empathy research interviews conducted with civilian travelers, airport employees, and airline employees provided confirmation of the problem spaces that were identified at the outset of this creative project as demonstrated by prior research and user journeys. An ideation session also allowed participants to brainstorm solutions to the problems identified through interviews and prior research into air travel experience. During the ideation session, each user journey was presented and discussed individually. Feedback from participants about user journeys led to the development of a prototype for an application designed to combat associated breakdowns. Specifically, this application provides a potential solution that addresses the changes and challenges related to airport processes brought on by the global COVID-19 pandemic, with an aim to improve travel efficiency throughout any airport.

The features illustrated in the images displayed in the previous section demonstrate the many ways that this app could create a better experience for the average air traveler. However, implementation of the app in actual airport settings may present challenges. As a standalone app, this product may be considered competition by airlines that have apps of their own. Thus, asking airlines to replace their existing apps with a single universal app may be met with resistance. Likewise, it may be difficult to persuade passengers to download the app in place of other airline apps. One potential solution to this roadblock is to offer the features found in the Universal Airport App as add-ons to existing airline applications. This ensures that breakdowns are addressed without requiring any extra work by passengers or creating any competition between this app and existing airline apps. Likewise, the creation of an application of this caliber will require a lot of maintenance related to all aspects of the air travel process. For example, there

may be a need to hire new employees who will maintain the app to ensure the repair of technical issues, user error evaluations, and more as the use of the app becomes more pervasive.

Although this project only represents one possible solution to the challenges faced by air travelers in a post-pandemic world, it points to a growing need for businesses and those who manage public spaces to begin thinking very practically and functionally about "the new normal." Many experts and average citizens have expressed concern that even after the COVID-19 pandemic is "over," we cannot go back to business as usual. Rather, we must learn from this experience and consider ways to mitigate another – and potentially even more dramatic – public health emergency of the future. Thus, this project makes an important contribution to the discussion of how mobile devices and other 21st century technologies can be used to address some of the most pressing challenges of managing large crowds, traffic flow, and customer service in widely used public spaces like airports and the like.

Limitations

The inability to recruit a greater number of interviewees for empathy research limited my ability to gather more information that could have resulted in a more thorough representation of all of the possible breakdowns faced by air travelers and airline employees. Time was also a limitation, in that the creative project timeline did not provide an opportunity to conduct a second round of empathy research that would have allowed me to dive deeper into the breakdowns identified during initial interviews.

Future Research

Interviews were conducted with English-speaking Americans. Future research should include interviews with individuals who speak other languages and represent different global

locations. Likewise, future research should expand additional demographic profiles, including by ethnicity, age, gender, and more to better understand the unique experiences of different traveler and airport employee personas. Additional travel scenarios could also be added to account for other potential breakdowns in the travel experience.

The final stage of design thinking – *test* – was not completed for this phase of the project. Thus, future work would first include iterative user testing that involves participants providing feedback about the usability and user experience of the prototype. Then, based on that feedback the prototype could be improved and tested again on the same dimensions. This iterative approach would allow for a proper evaluation by stakeholders who may potentially use the application to find which features may be more or less desirable. Additional research could include the implementation of the application within an airport setting to further assess efficacy in the wild.

Conclusion

With ever-changing processes that come with traveling by air, the passenger's journey and experience should be at the forefront. This project showed that when the passenger's experience is kept at high priority, other involved airline employees may also benefit from passengers becoming self-sufficient. Additionally, the design thinking methods used in this study provided guidance for the empathy research that led to the defined problems in which this creative project aimed to solve. The use of self-service technology is prevalent across most airports. However, the current self-service technologies are common touchpoints among all passengers, creating a hygienic concern. The implementation of an application reduces these common touchpoints, thus, reducing the concern of health safety and allowing passengers to be self-sufficient, also reducing the need for human-to-human interaction.

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Appendix A. UX Designer Interview Questions

How have your job responsibilities changed as a result of COVID?

What is the importance of technology in the airport process for travelers, specifically for check-in, TSA, and at the gate/boarding?

How do you identify problematic touchpoints (physical or technological) of an air travelers process-- specifically focusing on check-in, TSA, and the gate/boarding process? What is your process for addressing these issues and finding solutions?

How do you expect the growing use of self-service technologies to affect air travel in the future - specifically for checking-in, TSA, and at the gate/boarding?

What ways do you think the check-in process could be improved to make your job easier and to create a better airport experience for customers either through technology or through physical experiences?

What ways do you think the TSA process could be improved to make your job easier and to create a better airport experience for customers either through technology or through physical experiences?

What ways do you think the gate experience could be improved to make your job easier and to create a better airport experience for customers either through technology or through physical experiences?

What ways do you think the boarding process could be improved to make your job easier and to create a better airport experience for customers either through technology or through physical experiences?

Appendix B. Airline and Airport Employee Interview Questions

Since COVID, what process and procedure changes have made your specific job more difficult?

What is your employer and/or what are you doing to ensure both safety and efficiency in the airport and/or on the airplane?

What about the airline travel experience, beginning at the airport, do you think could be better?

When people are using self-check in kiosks what are common reasons they require assistance?

What takes the most time when someone is using the desk to check-in?

What ways do you think the check-in process could be improved to make your job easier and to create a better airport experience for customers?

What ways do you think the TSA process could be improved to make your job easier and to create a better airport experience for customers either through technology or through physical experiences?

What ways do you think the gate experience could be improved to make your job easier and to create a better airport experience for customers either through technology or through physical experiences?

What ways do you think the boarding process could be improved to make your job easier and to create a better airport experience for customers either through technology or through physical experiences?

How do you expect the growing use of self-service technologies to affect air travel in the future - specifically for checking-in, TSA, and at the gate/boarding?

Appendix C. Civilian Traveler Interview Questions

How does the airport experience differ now vs. pre-COVID-- specifically thinking about check-in, TSA, and gate/boarding process?

What do you like/dislike about the changes?

What ways do you think the check-in processes could be improved to create a better airport experience for you and other customers either through technology or through physical experiences?

What ways do you think the TSA processes could be improved to create a better airport experience for you and other customers either through technology or through physical experiences?

What ways do you think the gate experience and boarding process could be improved to create a better airport experience for you and other customers either through technology or through physical experiences?

What frustrates you most about the overall airport experience?